

Malthusian Descriptive Analysis Contemporary Matters
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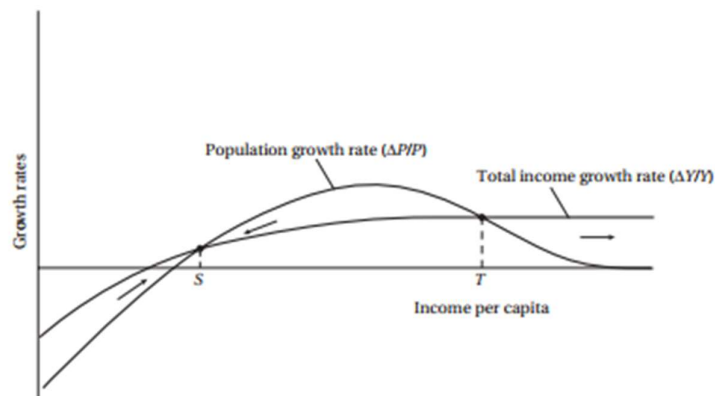
Abstract

This study looks into the ongoing important relevance of Malthusian theory in today's world. The author use data from the World Bank covering 1960 to 2023, the author analyzed this theory through descriptive graphs. The results show that the theory's application varies significantly from country to country. This analysis provides insights into the different ways population growth and economic growth affect each nation, emphasizing the need to consider local factors and historical contexts when evaluating the theory's relevance in contemporary economic discussions.

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Over two hundred years ago, Reverend Thomas Malthus introduced a compelling theory regarding the interplay between population growth and economic development, which remains relevant today. In his 1798 work, "Essay on the Principle of Population," Malthus utilized the principle of diminishing returns to argue that a nation's population, unless constrained by a reduction in food resources, tends to increase at a geometric rate, potentially doubling every 30 to 40 years. Concurrently, due to diminishing returns associated with the fixed resource of land, food production could only grow at an arithmetic rate. As the population expands, each individual would have access to less land, resulting in a decline in their marginal contribution to food production. Consequently, the increase in food supply would lag behind population growth, leading to a decrease in per capita incomes—defined in agrarian societies as per capita food production—ultimately resulting in a stable population that barely exists at or just above subsistence levels. Malthus argued that the only means to avert this persistent state of low living standards or absolute poverty was for individuals to practice "moral restraint" and limit their offspring. Thus, Malthus can be viewed, albeit indirectly, as a precursor to the contemporary birth control movement.

Contemporary economists have labeled the Malthusian concept of a population inevitably constrained to subsistence income levels as the low-level equilibrium population trap, or more concisely, the Malthusian population trap. This fundamental Malthusian model can be visually represented by comparing the shapes and positions of curves that depict population growth rates and aggregate income growth rates, with both curves plotted against levels of per capita income.



Source: Todaro, 2020

Initially, it is essential to examine population growth. When income is extremely low, for instance, below \$250 annually when adjusted for purchasing power parity, nutritional standards decline significantly, rendering individuals vulnerable to severe infectious diseases. Complications arise during pregnancy and nursing, and ultimately, the risk of starvation increases. This phenomenon is illustrated on the left side of Figure 1. Once a minimum income per capita threshold is achieved, population growth commences, potentially reaching a peak growth rate of approximately 3% to 4% per year. Subsequently, the growth rate begins to decline until a relatively stable population is established, characterized by a growth rate nearing zero.

In Figure 1, as the economy progresses and per capita income increases, total income growth accelerates. The underlying economic rationale for this favorable correlation is the premise that savings tend to increase in tandem with per capita income. It is posited that nations with elevated per capita incomes can achieve higher savings rates, thereby facilitating greater investment. According to a Harrod-Domar model of economic growth, enhanced savings rates correspond to increased aggregate income growth. However, growth will eventually plateau at a certain maximum level. It is noteworthy that middle-income countries may experience the most rapid

growth as they adopt advanced technologies to bridge the gap, although such elevated growth rates cannot be sustained once the technological frontier is attained.

Soete, L, (2009) signposted that the nature of the Malthusian challenges we face today seems to encompass both global and local dimensions. On one hand, it prompts discussions regarding the necessity for open, international collaboration in research. The increasing demand for local knowledge adaptation, reuse, and integration in various emerging and developing nations, which involves fostering local innovation efforts, is quite similar to the evolution of numerous innovation policy instruments in European regions and countries. They designate the first policy challenge as "recherche sans frontières," while the second is referred to as "innovation for local development."

Chowdhury, M. N. M., & Hossain, M. M. (2018) identified that Bangladesh is encountering significant environmental challenges as a result of population growth. Currently, the country's GDP is rising swiftly alongside population increases, which exerts pressure on natural resources and elevates pollution levels. Bangladesh's economy has seen substantial growth recently, with an annual GDP increase of 7.3% in 2017. This swift economic advancement is harming the environment and diminishing air quality; the rapid growth of industrial production and urban development has led to water contamination and an upsurge in industrial waste, which has resulted in health issues. Malthus's contributions to economic development include several elements that resonate with the experiences of developing countries such as Bangladesh and Pakistan. The findings of this research align with Malthus's hypothesis that unchecked population growth can lead to economic disaster. This study identified a highly significant negative relationship between population growth and economic development. Rapid population increase can hinder the prospects for economic growth unless the government intervenes with appropriate measures to address food issues using alternative strategies like exporting skilled labor abroad, fostering local small industries, implementing agricultural advancement initiatives, promoting labor-intensive industries (given the availability of inexpensive labor), attracting foreign investors, establishing institutions, and ensuring political stability. Malthusian Graph descriptive analysis was also utilized by Chowdhury, M.N.M., et al. (2018) to examine the occurrence in Bangladesh.

Afzal, M. (2009) studied that the rapid increase in population has reached alarming levels in Pakistan. In 1947, it was the 13th most populous nation with a population of 32.5 million; now, Pakistan ranks as the 6th most populous country globally, with a population of 162 million. The country's demographic issue is concerning, particularly due to its momentum and structure. Pakistan has the highest birth and total fertility rates among Asian nations. Between 1950 and 2001, the population of Pakistan grew by 430 percent. The policies and programs implemented by the Government of Pakistan to manage unrestrained population growth have not yielded significant success. Many individuals do not grasp the adverse economic effects of rapid population growth, influenced by societal and cultural factors. Afzal, M. (2009) developed a straightforward model to empirically analyze the connection between population growth and economic development in Pakistan. The specifications and diagnostic evaluations confirmed the model's statistical validity. The highly significant and negative coefficient associated with population growth indicates that it is indeed a major issue in Pakistan, as it negatively impacts economic development. Instead of being allocated to productive uses, resources are consumed by the rapidly expanding population.

Azam, M. et al. (2020) seeks to quantitatively analyze the relationship between population and economic growth in India from 1980 to 2018. In their research, the ADF unit root test is applied to assess the stationarity of the time-series data. The results from the unit root tests indicate that

the ARDL approach should be used to investigate the long-term relationship between population and economic growth. The findings demonstrate a significant positive correlation between increasing population and economic growth in both the short and long terms. These outcomes lend support to Kremer's hypothesis, which posits that a larger population will lead to greater economic growth. Other factors, such as investment and life expectancy, also show a positive correlation with economic growth over the long term. Conversely, the inflation rate has a detrimental impact in both the short and long terms. The results from the Toda-Yamamoto causality test reveal a unidirectional causality flowing from population to economic growth. This evidence suggests that population growth in India positively influences the nation's economic development. This conclusion provides empirical support for the hypothesis that economic growth is driven by population growth, which is the most crucial finding of this study. These results imply that policymakers should develop effective strategies for managing population growth while fostering sustainable economic development.

According to the country-level research in Kenny, C. (2010), (i) the relationship between income and population increase is (almost) always distinctive, and (ii) there is minimal evidence of diminishing returns to scale due to land carrying capacity restrictions everywhere. Non-income factors are driving population dynamics in a way that lowers population growth rates globally. Despite the fact that land is a crucial component of production, output is rising globally at the same time, which is inconsistent with sharply decreasing returns to scale. Overall, the research points out that advancements and various non-income factors are helping boost production and manage population growth, rather than just the amount of money people have or the amount of land available.

In nowadays, hundred years after Malthus (1803), fertility rates in developing regions dropped by more than half, while living standards more than doubled. In their analysis, Chatterjee, S., & Vogl, T. (2018) examine how changes in fertility corresponded with economic growth during this period, utilizing data from 2.3 million women across 255 household surveys. The authors found that responses to economic fluctuations and long-term growth varied, with these differences manifesting throughout the life cycle. Fertility rates were procyclical, decreasing and being postponed in relation to sustained economic growth; fluctuations occurring later (but not earlier) in the reproductive phase influenced lifetime fertility. Chatterjee, S., & Vogl, T. (2018) noted that over the past fifty years, the developing world experienced increased living standards coupled with decreasing fertility rates, yet empirical data linking the two remains surprisingly limited. By merging hundreds of survey datasets, the study provides new perspectives on growth-fertility dynamics, meticulously considering time frames and life-cycle effects. Three primary findings emerge from the research. First, fertility tends to be procyclical in the short term, decreasing during economic downturns. Second, fertility rates decline and are postponed as a result of long-term economic growth. Third, among different birth cohorts within a country, increased economic growth occurring later in the reproductive phase is associated with higher completed fertility. These findings generally align with an extension of long-term growth models that incorporate endogenous fertility into a life cycle framework.

In his paper, Dao, M.Q (2012) employs a statistical model alongside data from a sample of forty-three developing economies to examine the empirical effects of various aspects of demographic transition on per capita GDP growth. It is noted that including interactive variables in the model strengthens the results. The following conclusions can be drawn; The relationship between population growth and per capita GDP growth is consistently negative and exhibits a linear pattern. This negative effect is more pronounced when interaction terms are integrated into the statistical model. Governments in developing nations can potentially enhance growth by managing population growth; China exemplifies this through its implementation of strict

measures that decreased the total fertility rate from approximately 5.8 to 2.2 births per woman between 1970 and 1980. Besides that, a decline in fertility influences the age composition of a developing country's population, which is found to have no significant statistical effect on economic growth when both young and old dependency ratios are factored into the model. The impact of the old dependency ratio on per capita GDP growth is consistently negative and becomes more significant when interaction terms are added to the model. Conversely, the interactions between the young dependency ratio and population growth, as well as the condition that the average annual population growth rate is below 1.2 percent, have a positive effect on economic growth. And then, the degree of urbanization and urban growth show no statistically significant effects on per capita GDP growth. This finding may be attributed to the fact that these two aspects of demographic transition produce both positive and negative impacts on economic growth, which effectively cancel each other out.

Many issues related to pollution, environmental degradation, and resource scarcity have been examined from various perspectives, but these concerns essentially reflect a deeper issue: population growth. Montano, B., et.al. (2020) have observed that while the growth rate has been exponential, there are indications that it is beginning to decelerate. Nations with higher levels of human development tend to have lower birth rates, whereas globally, the average fertility rate has decreased from 4.95 between 1950 and 1955 to 2.36 from 2010 to 2015. Concurrently, there has been an observed rise in production levels, which can be attributed to advancements in technology, increases in labor, greater capital investments, and enhanced resource utilization. Drawing from this increased utilization of production factors, it is possible to forecast future tensions between the demand and supply of certain resources. Thus, future articles will aim to delve into the specific situations of three critical markets for production and consumption: water, energy, and food. Furthermore, Montano, B., et.al. (2020) have established that one of the Malthusian theories is no longer applicable to all nations. An increase in wealth per capita does not inherently lead to population growth. Montano, B., et.al. (2020) have developed a model that illustrates population growth in relation to its trajectory and the changes in GDP, revealing two categories of countries. First, there are developed or post-demographic transition nations, where long-term fluctuations in wealth do not influence population levels, although temporary GDP shocks can have an impact. Recognizing this duality among nations is crucial concerning all the aforementioned challenges. Thus, some countries will see their populations increase alongside rising GDP per capita, while others have detached their population dynamics from long-term income variations. It is important to keep in mind that sustainability is a highly complex matter connected to society as a whole, which transforms factors like pollution, environmental conditions, resource availability, productivity, technological advancements, efficiency, and demographic changes into vital elements.

Peterson, E. W. F. (2017) utilizes historical data to illustrate the relationships among population growth, per capita output advancement, and overall economic growth throughout the last 200 years. The connection between population growth and economic growth is a debated topic. In high-income nations, slow population growth could lead to social and economic challenges, while rapid population growth in low-income countries might hinder their progress. International migration could potentially address these disparities, although it faces opposition from many. Based on economic evaluations of inequality, it seems that reduced population growth and restricted migration could lead to heightened levels of economic inequality both nationally and globally.

Ehrlich, I., & Lui, F. (1997) stated that the ongoing changes in population dynamics in countries experiencing steady growth present us with both exciting challenges and opportunities. In the past, scholars often worried about the potential for rapid population growth to hinder progress,

but today, we're facing a different issue: the trend of declining birth rates and an aging population. Some existing research has already started to explore the positive connections between longer life spans and economic prosperity, and many have generally found a hopeful outlook on how aging populations can contribute to growth. However, these studies often view longevity as a fixed factor rather than something we can actively influence through our economic choices and development strategies. Another key area for exploration is creating models of growth that consider the diverse experiences of different groups within the same economy rather than treating everyone the same. By doing so, we can better understand the varying patterns of fertility, life expectancy, and income growth that exist. This approach may also shed light on how income inequality interacts with economic growth, leading to richer insights for us all.

The idea that a high population can impact income per person is still important to consider, especially in developing countries where many people depend on agriculture, as well as those relying on mineral and energy exports. The impact of these Malthusian effects can be seen differently by different people. In many developing nations, resources make up about 30 percent of income. Using an estimated elasticity, such a country would be 26 percent richer in per capita terms if it had half as many people. This increment is significant, but it is pretty small in comparison to the differences in income between rich and poor countries, which exceed a factor of 20. Weil, D.N. et. al. in 2009 took a closer look at this Malthusian channel, assuming other factors remain constant. So, while Malthus's ideas can be important, having a large population doesn't automatically mean a country will be stuck in poverty; there are many other factors that can help lift the situation. Likewise, just because a nation is thriving with a growing population doesn't mean the Malthusian model is incorrect. Our discussion also doesn't suggest that reducing fertility is the best way to boost economic growth; there are many paths to prosperity.

Research Contribution

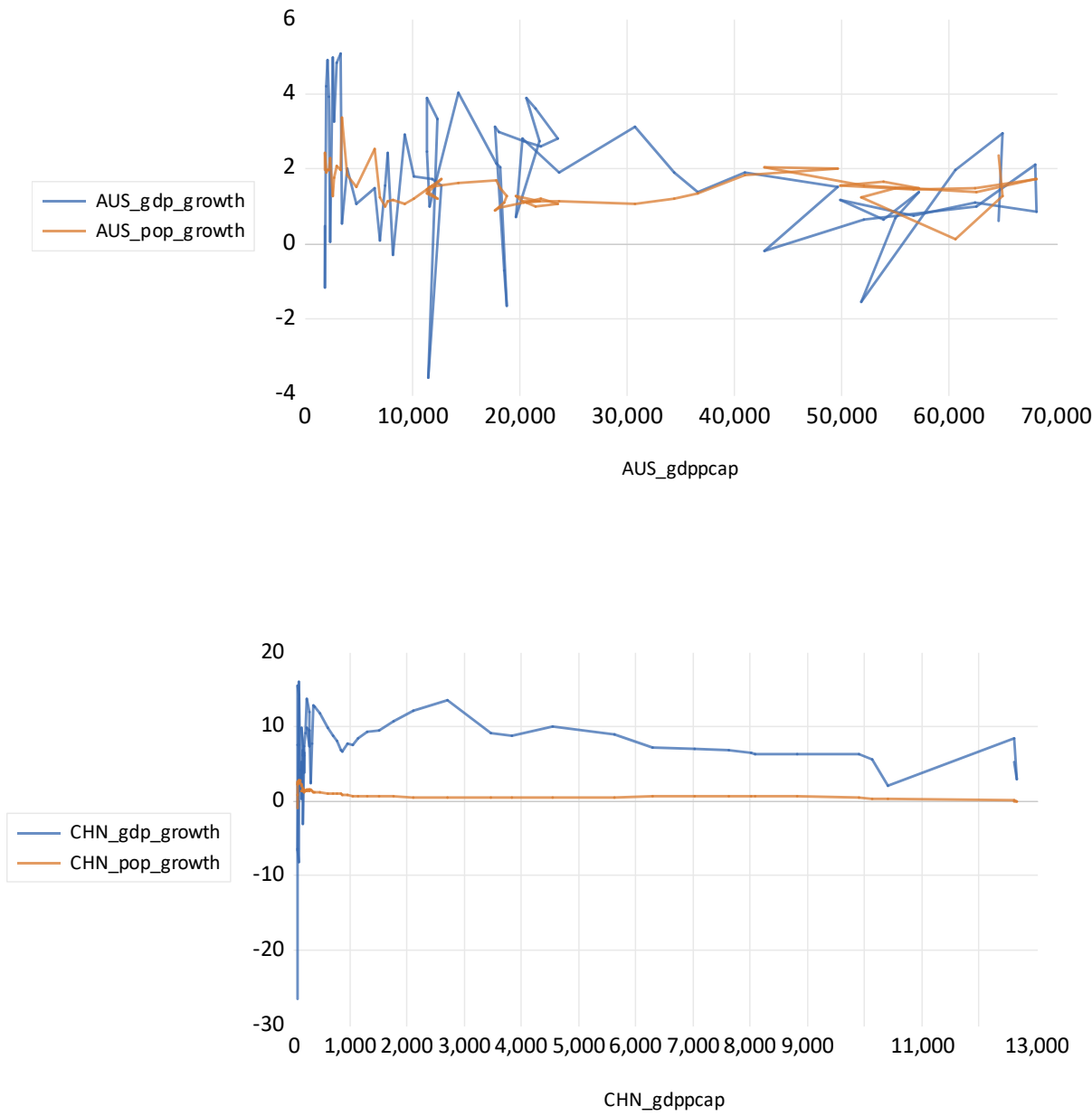
This study intended to illustrate contemporary Malthusian graphs in selected countries. The objective for this research was to explore and descriptively analyze contemporary Malthusian pattern in a global context. The research contribution is analyzed the contemporary matter of Malthusian pattern.

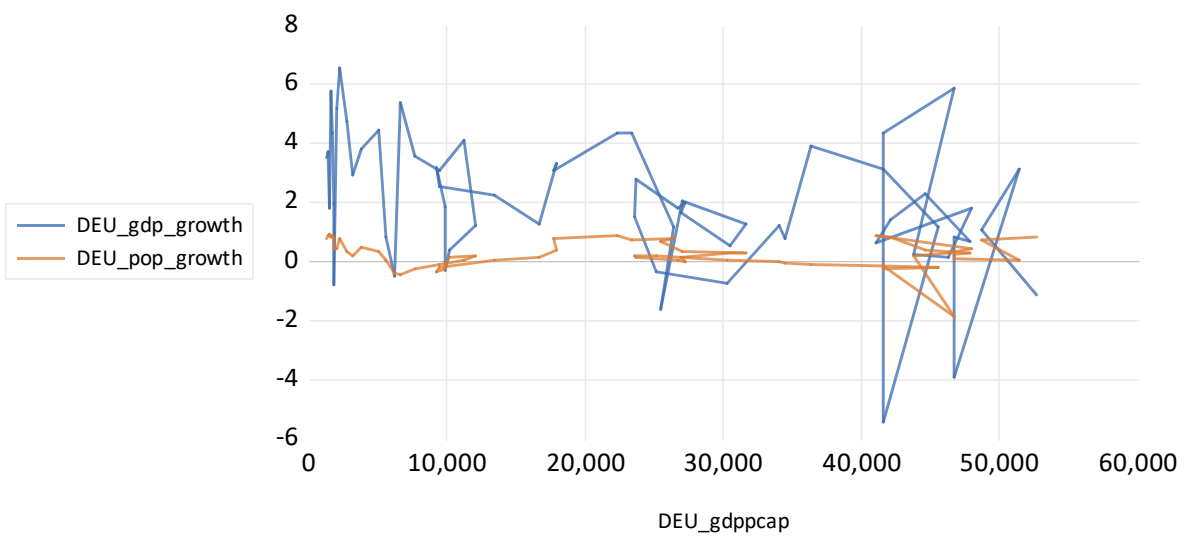
Data and Research Method

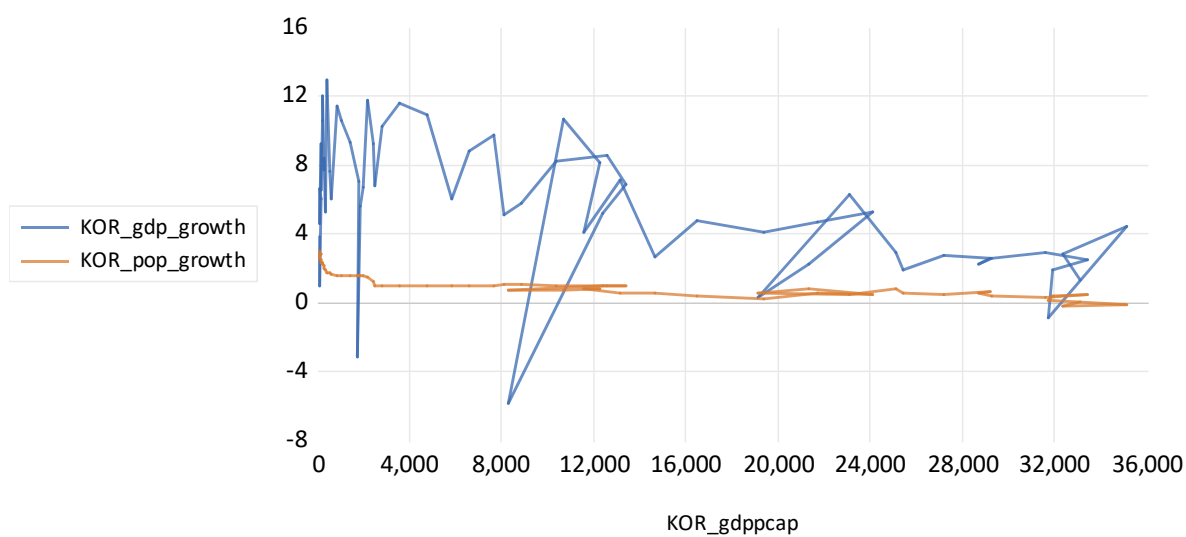
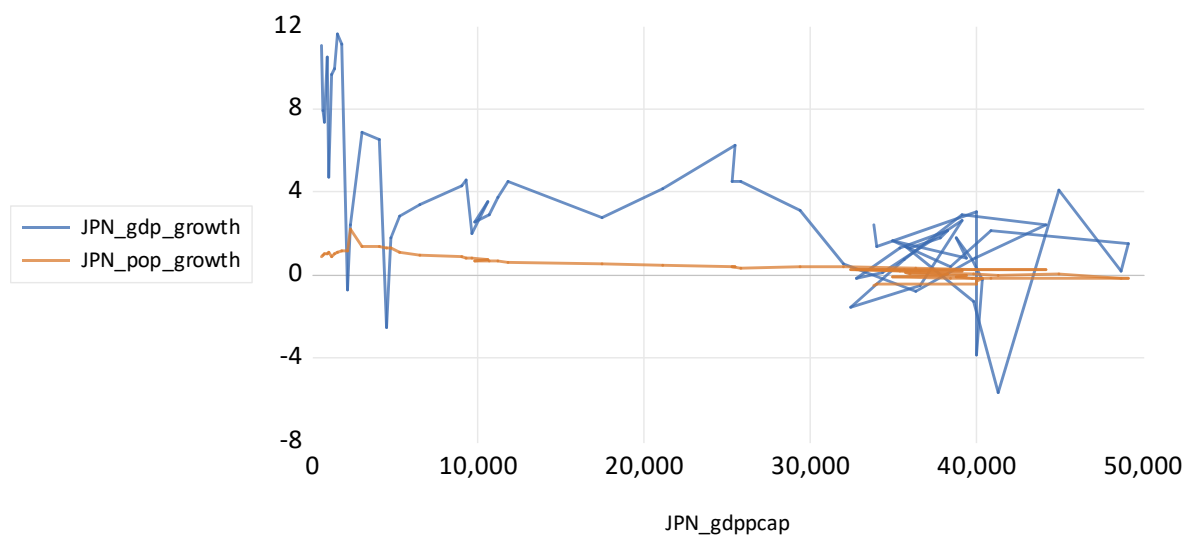
The author use data from the World Bank covering 1960 to 2023, the author analyzed this theory through descriptive graphs. The author used GDP growth, Population Growth, and GDP per Capita as variables.

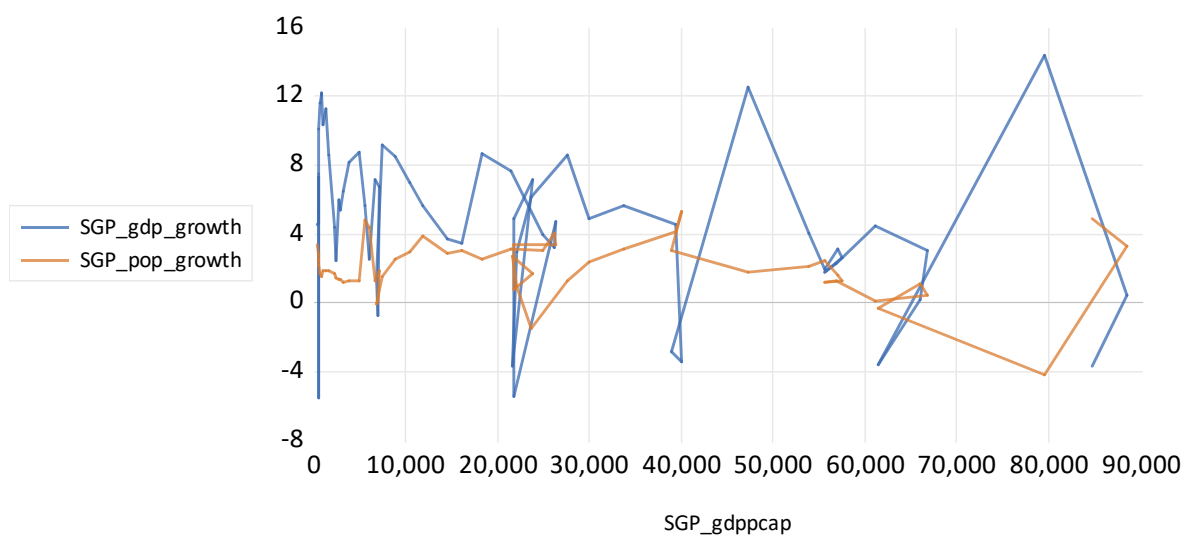
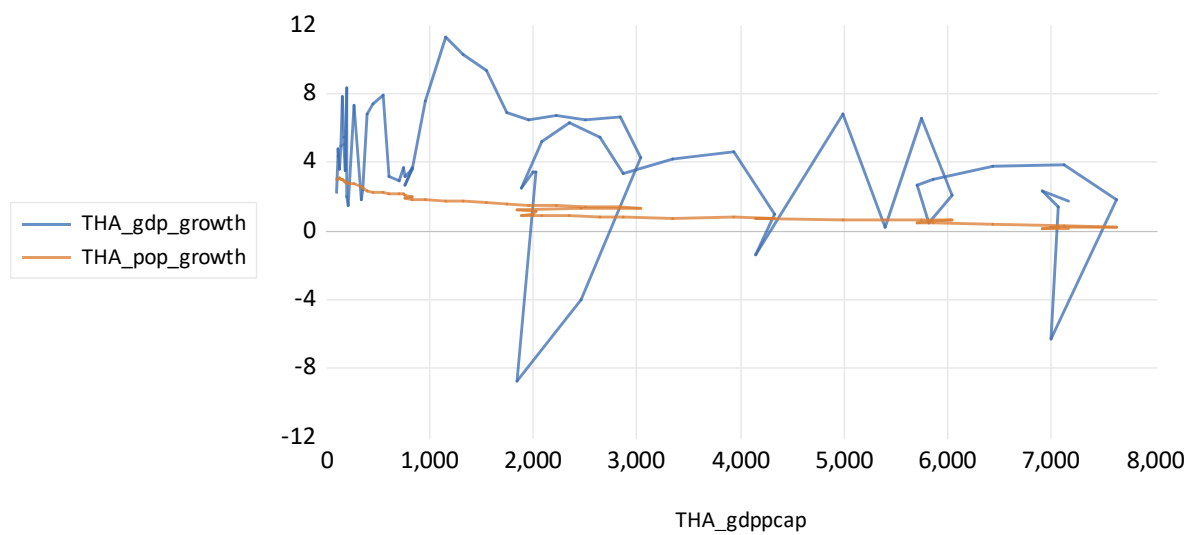
Results and Discussions

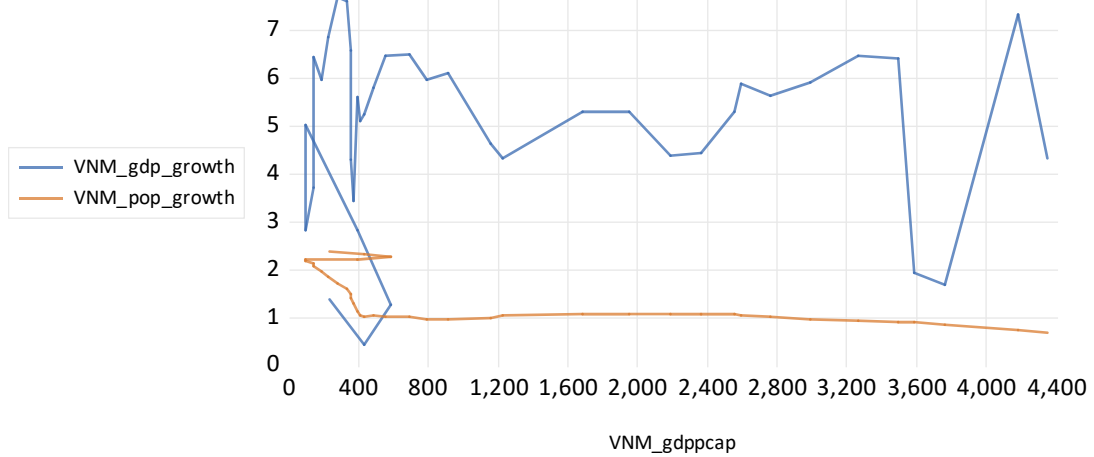
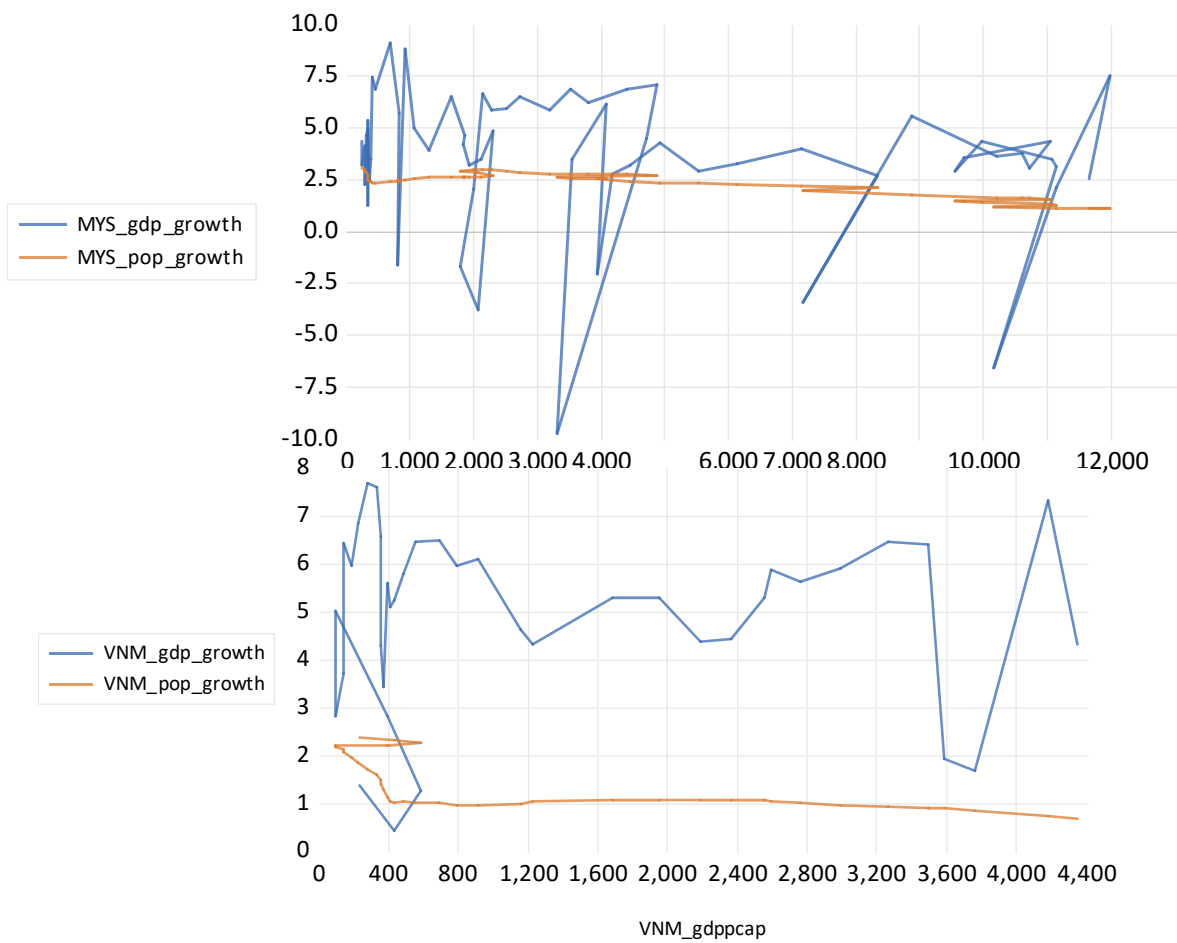
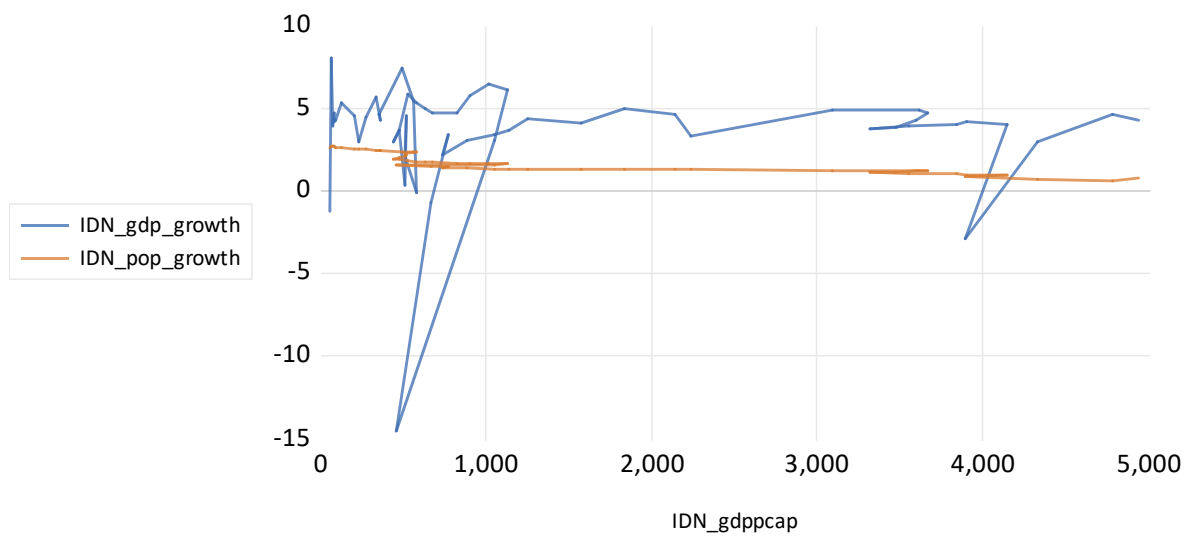
Based on Malthusian graph, the writer attempted to designed the descriptive graphic analysis per country at 1960-2023. These are the distinctive results:

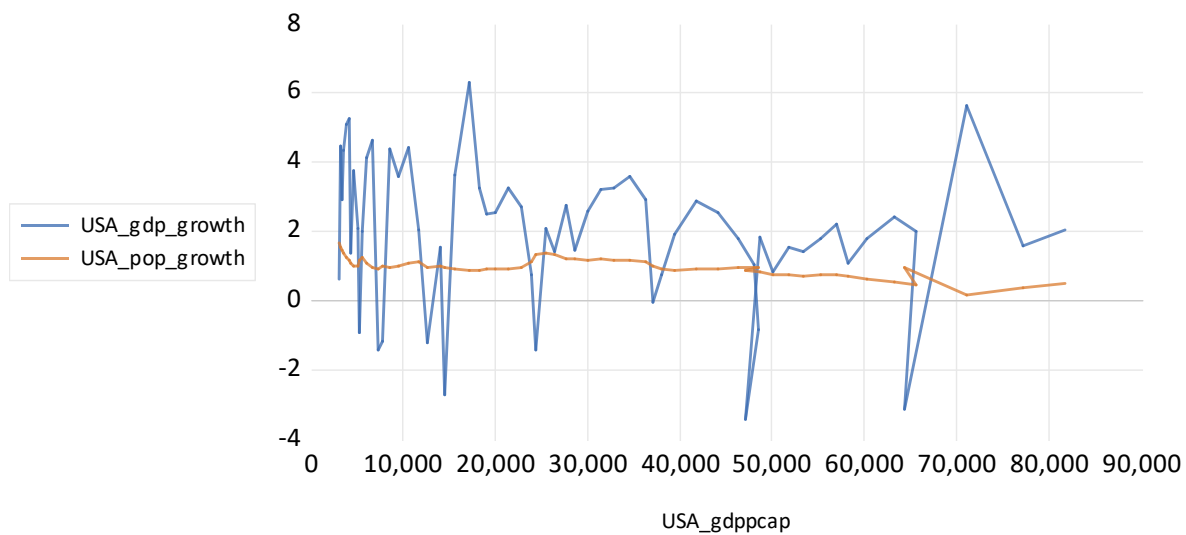












In the instance the economic growth rate surpasses the population growth rate, the GDP per capita increases. This implies that the economy is expanding faster than the population, leading to higher average wealth per individual, improved living standards, and better access to goods and services.

On the other hand, if the economic growth rate lags behind the population growth rate, the GDP per capita decreases. This indicates that the population is growing faster than the economy, which can result in lower average wealth, as well as potential struggles in providing sufficient resources, jobs, and services for the growing population.

Subsequently, in the case the economic growth rate ties the population growth rate, the GDP per capita remains constant. In this scenario, the average wealth of individuals does not change significantly, reflecting a balanced economic environment where the economy keeps pace with population growth.

Respectively nation's graph had a distinct pattern from the standard Malthusian graph, as we detected. Noticeably nation had its own distinctive pattern. Most graphs illustrate the later GDP per capita level, featuring the GDP growth line above the population growth line. The in-depth examination of these patterns in every graph prompted discussion.

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